AMENDMENT TO THE DRAWINGS

The attached sheet(s) of drawings includes changes to Figs. 3, 16, 17, 42, 43, 62, 75, and 79. Also attached are annotated sheets showing the changes made to Figs. 3, 16, 17, 42, 43, 62, 75, and 79.

Attachment: Replacement Sheet(s), eight pages
Annotated Sheet(s) Showing Changes, eight pages

REMARKS

If clarification of the amendment or application is desired, or if issues are present which the Examiner believes may be quickly resolved, the Examiner is invited to initiate a telephone interview with the undersigned attorney to expedite prosecution of the present application.

If there are any additional fees resulting from this communication, please charge same to our Deposit Account No. 18-0160, our Order No. SAT-16312.

Respectfully submitted,

RANKIN, HILL, PORTER & CLARK LLP

By _____
David E. Spaw, Reg. No. 34732

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FIG.3

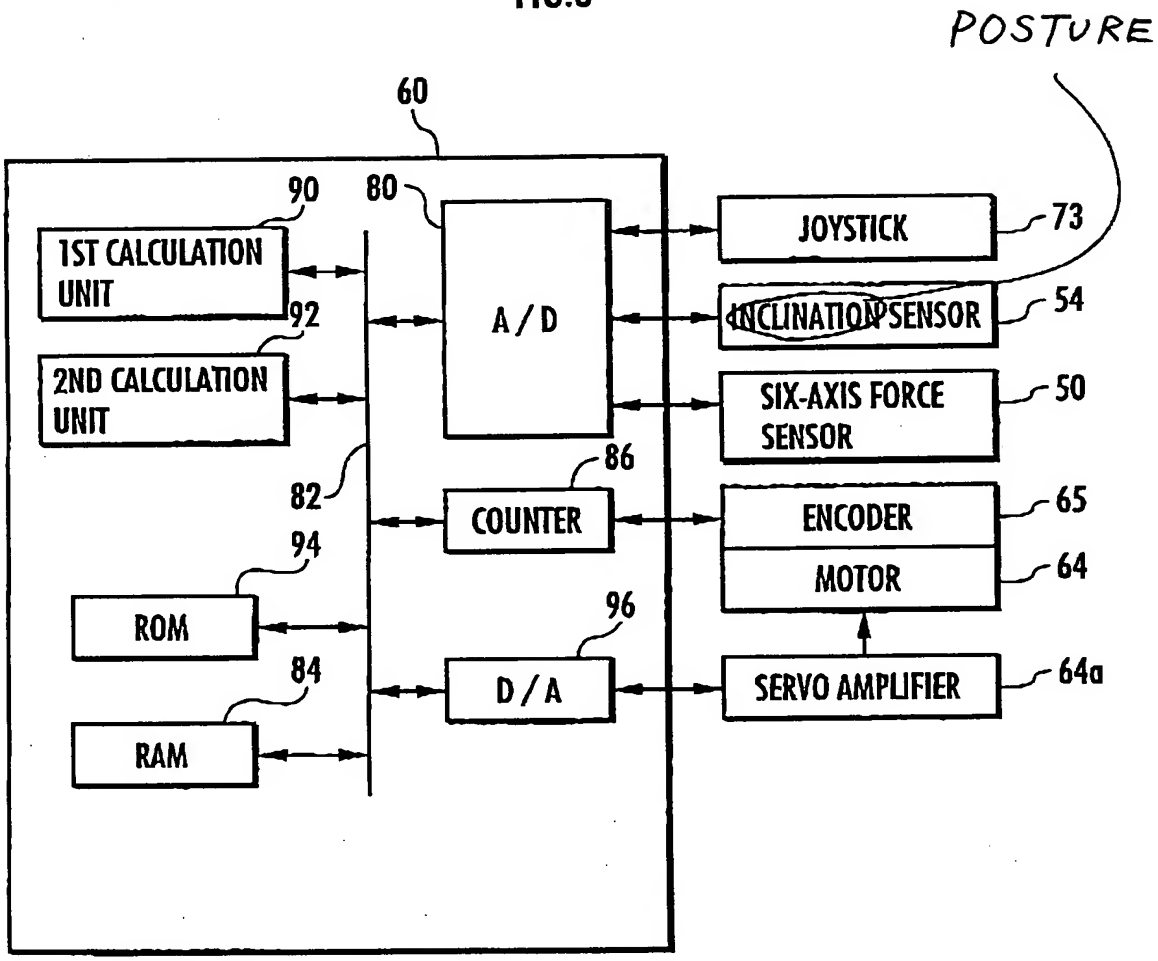

POSTURE
60
90
80
1ST CALCULATION UNIT
92
2ND CALCULATION UNIT
A / D
JOYSTICK
73
INCLINATION SENSOR
54
SIX-AXIS FORCE SENSOR
50
82
86
COUNTER
ENCODER
65
MOTOR
64
94
ROM
96
84
D / A
SERVO AMPLIFIER
64a
RAM

FIG.16

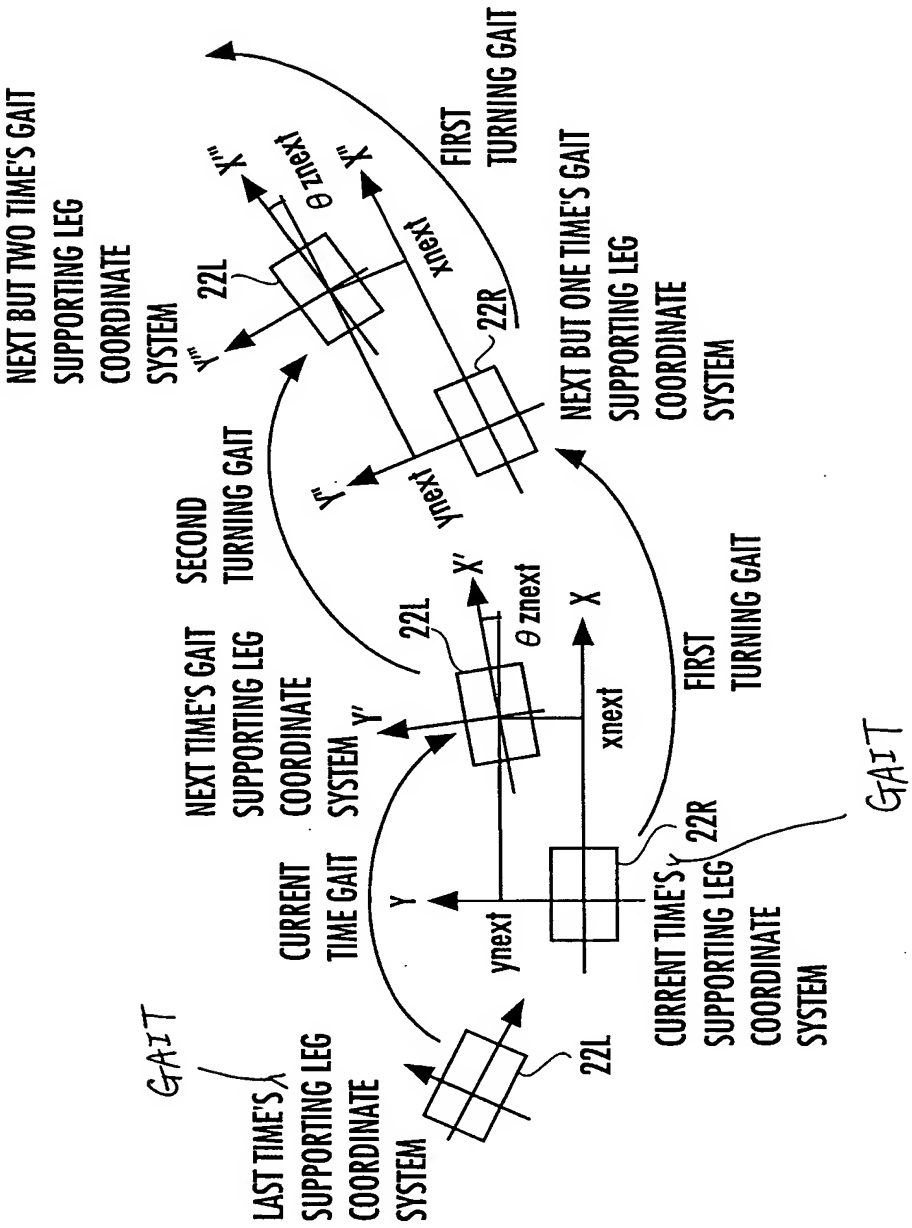

LAST TIME'S GAIT SUPPORTING LEG COORDINATE SYSTEM
CURRENT TIME GAIT SUPPORTING LEG COORDINATE SYSTEM
NEXT TIME'S GAIT SUPPORTING LEG COORDINATE SYSTEM
NEXT BUT ONE TIME'S GAIT SUPPORTING LEG COORDINATE SYSTEM
NEXT BUT TWO TIME'S GAIT SUPPORTING LEG COORDINATE SYSTEM
FIRST TURNING GAIT
SECOND TURNING GAIT
FIRST TURNING GAIT
22L
22R
22L
22R
22L
X
Y
X'
Y'
X"
Y"
X'"
Y'"
xnext
ynext
θ znext
θ znext
xnext
ynext
GAIT
GAIT

FIG.17

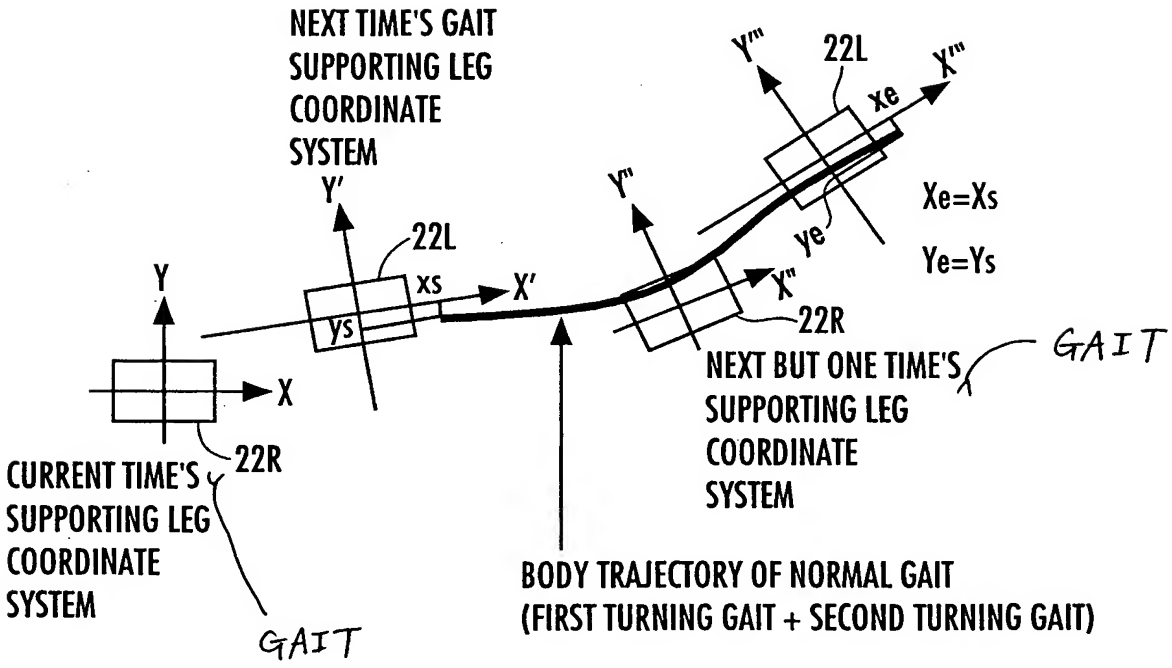

NEXT TIME'S GAIT SUPPORTING LEG COORDINATE SYSTEM
Y'
22L
xs
ys
X'
Y
X
22R
CURRENT TIME'S SUPPORTING LEG COORDINATE SYSTEM
GAIT
Y"
Y'''
22L
xe
X'''
Xe=Xs
ye
Ye=Ys
X"
22R
NEXT BUT ONE TIME'S SUPPORTING LEG COORDINATE SYSTEM
GAIT
BODY TRAJECTORY OF NORMAL GAIT
(FIRST TURNING GAIT + SECOND TURNING GAIT)

FIG.42

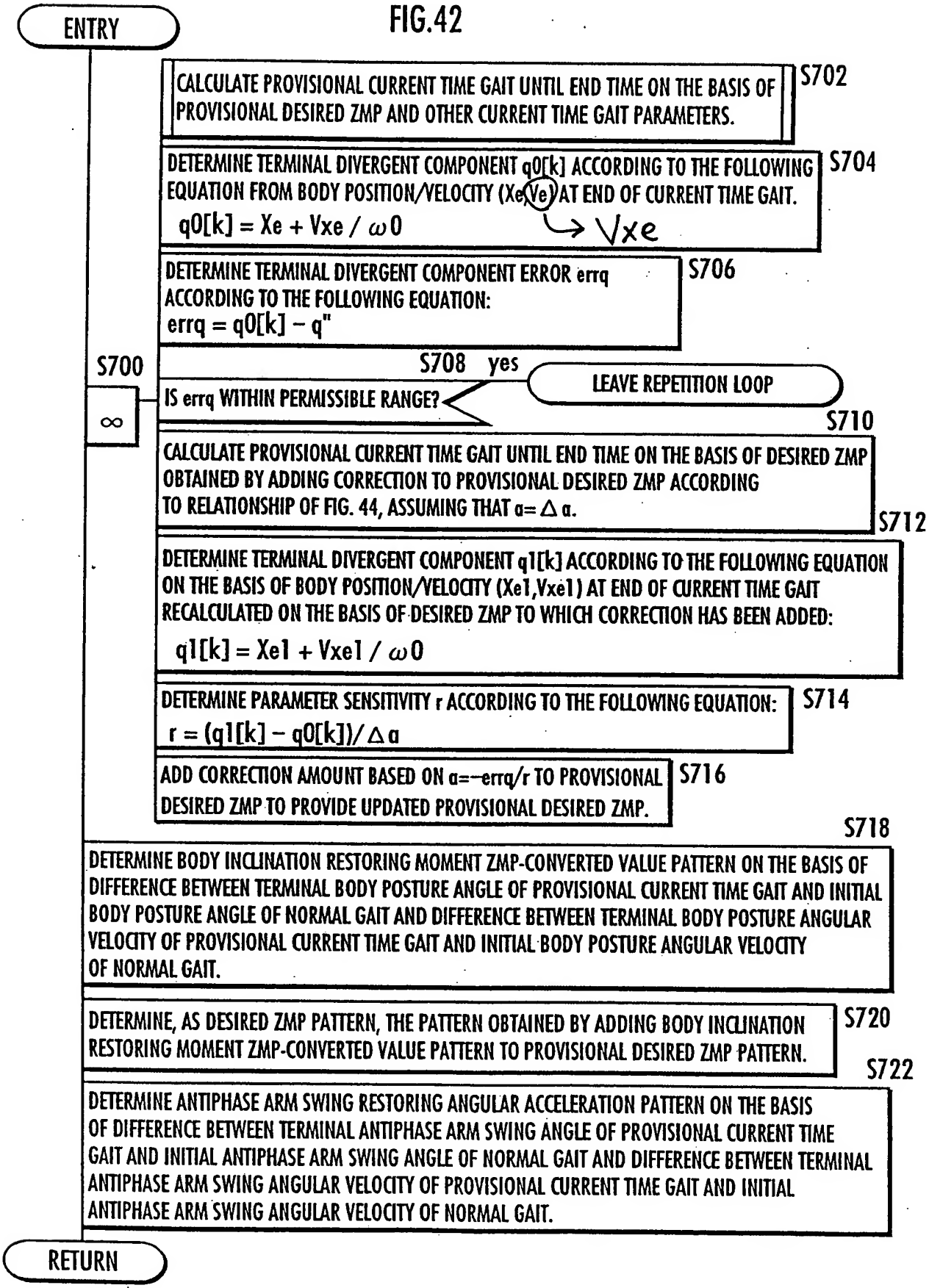

ENTRY
CALCULATE PROVISIONAL CURRENT TIME GAIT UNTIL END TIME ON THE BASIS OF PROVISIONAL DESIRED ZMP AND OTHER CURRENT TIME GAIT PARAMETERS.
S702
DETERMINE TERMINAL DIVERGENT COMPONENT q0[k] ACCORDING TO THE FOLLOWING EQUATION FROM BODY POSITION/VELOCITY (Xe,Ve) AT END OF CURRENT TIME GAIT.
q0[k] = Xe + Vxe / ω0
Vxe
S704
DETERMINE TERMINAL DIVERGENT COMPONENT ERROR errq ACCORDING TO THE FOLLOWING EQUATION:
errq = q0[k] − q"
S706
S700
∞
S708
yes
IS errq WITHIN PERMISSIBLE RANGE?
LEAVE REPETITION LOOP
S710
CALCULATE PROVISIONAL CURRENT TIME GAIT UNTIL END TIME ON THE BASIS OF DESIRED ZMP OBTAINED BY ADDING CORRECTION TO PROVISIONAL DESIRED ZMP ACCORDING TO RELATIONSHIP OF FIG. 44, ASSUMING THAT α= Δ α.
S712
DETERMINE TERMINAL DIVERGENT COMPONENT q1[k] ACCORDING TO THE FOLLOWING EQUATION ON THE BASIS OF BODY POSITION/VELOCITY (Xe1,Vxe1) AT END OF CURRENT TIME GAIT RECALCULATED ON THE BASIS OF DESIRED ZMP TO WHICH CORRECTION HAS BEEN ADDED:
q1[k] = Xe1 + Vxe1 / ω0
DETERMINE PARAMETER SENSITIVITY r ACCORDING TO THE FOLLOWING EQUATION:
r = (q1[k] − q0[k])/ Δ α
S714
ADD CORRECTION AMOUNT BASED ON α=−errq/r TO PROVISIONAL DESIRED ZMP TO PROVIDE UPDATED PROVISIONAL DESIRED ZMP.
S716
S718
DETERMINE BODY INCLINATION RESTORING MOMENT ZMP-CONVERTED VALUE PATTERN ON THE BASIS OF DIFFERENCE BETWEEN TERMINAL BODY POSTURE ANGLE OF PROVISIONAL CURRENT TIME GAIT AND INITIAL BODY POSTURE ANGLE OF NORMAL GAIT AND DIFFERENCE BETWEEN TERMINAL BODY POSTURE ANGULAR VELOCITY OF PROVISIONAL CURRENT TIME GAIT AND INITIAL BODY POSTURE ANGULAR VELOCITY OF NORMAL GAIT.
DETERMINE, AS DESIRED ZMP PATTERN, THE PATTERN OBTAINED BY ADDING BODY INCLINATION RESTORING MOMENT ZMP-CONVERTED VALUE PATTERN TO PROVISIONAL DESIRED ZMP PATTERN.
S720
S722
DETERMINE ANTIPHASE ARM SWING RESTORING ANGULAR ACCELERATION PATTERN ON THE BASIS OF DIFFERENCE BETWEEN TERMINAL ANTIPHASE ARM SWING ANGLE OF PROVISIONAL CURRENT TIME GAIT AND INITIAL ANTIPHASE ARM SWING ANGLE OF NORMAL GAIT AND DIFFERENCE BETWEEN TERMINAL ANTIPHASE ARM SWING ANGULAR VELOCITY OF PROVISIONAL CURRENT TIME GAIT AND INITIAL ANTIPHASE ARM SWING ANGULAR VELOCITY OF NORMAL GAIT.
RETURN

FIG.43

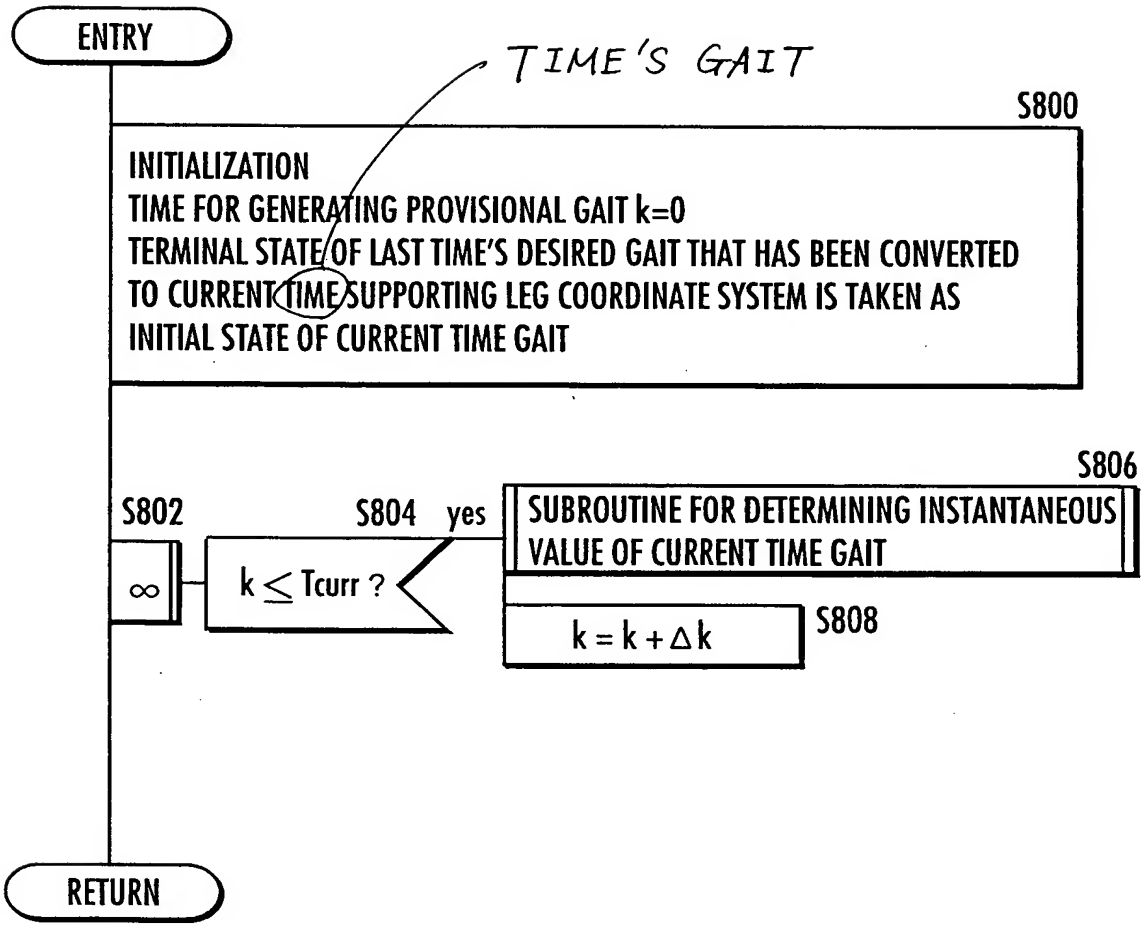

ENTRY
TIME'S GAIT
S800
INITIALIZATION
TIME FOR GENERATING PROVISIONAL GAIT k=0
TERMINAL STATE OF LAST TIME'S DESIRED GAIT THAT HAS BEEN CONVERTED TO CURRENT TIME SUPPORTING LEG COORDINATE SYSTEM IS TAKEN AS INITIAL STATE OF CURRENT TIME GAIT
S806
S802
S804
yes
SUBROUTINE FOR DETERMINING INSTANTANEOUS VALUE OF CURRENT TIME GAIT
∞
k ≤ Tcurr ?
k = k + Δk
S808
RETURN

FIG.62

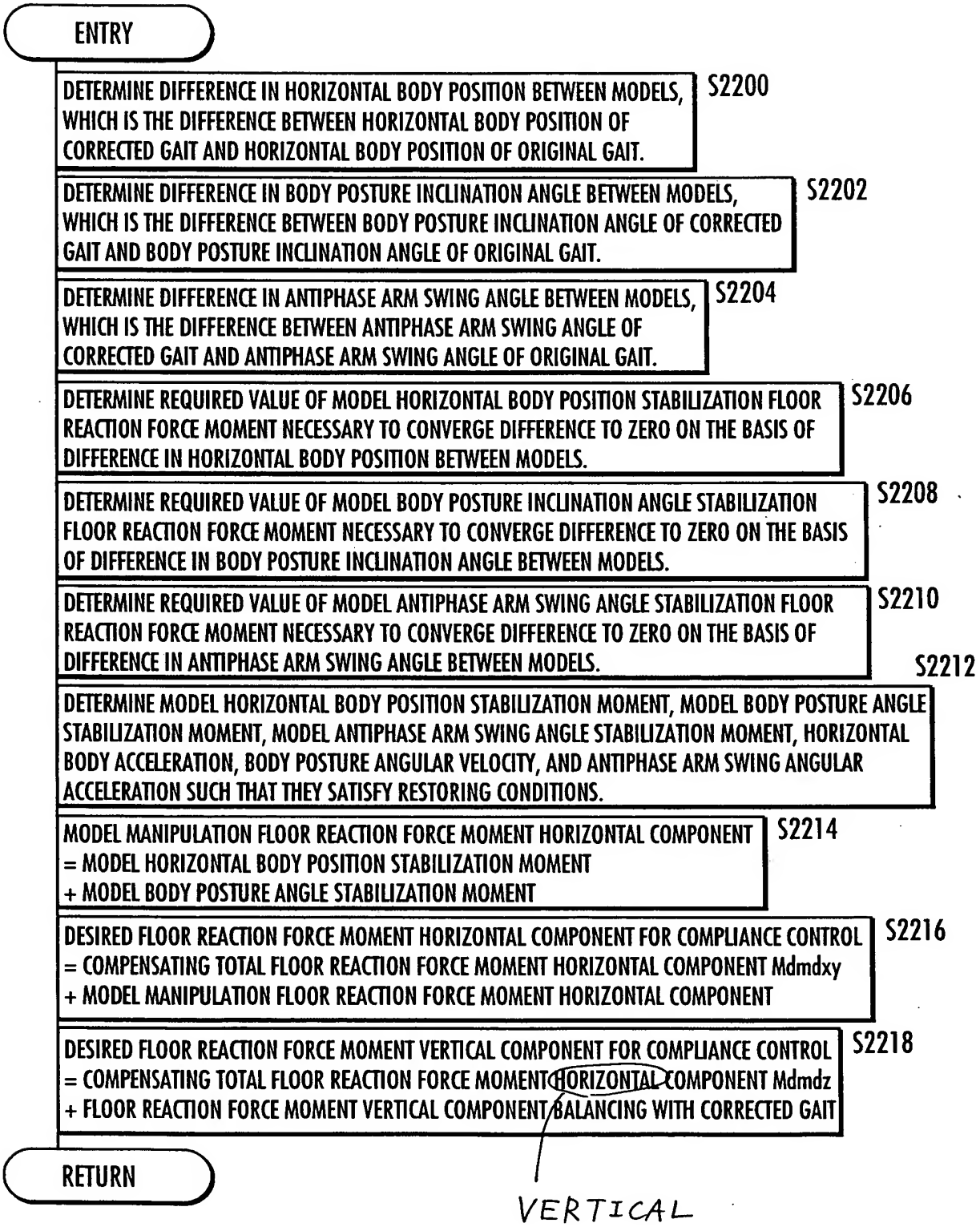

ENTRY
DETERMINE DIFFERENCE IN HORIZONTAL BODY POSITION BETWEEN MODELS, WHICH IS THE DIFFERENCE BETWEEN HORIZONTAL BODY POSITION OF CORRECTED GAIT AND HORIZONTAL BODY POSITION OF ORIGINAL GAIT.
S2200
DETERMINE DIFFERENCE IN BODY POSTURE INCLINATION ANGLE BETWEEN MODELS, WHICH IS THE DIFFERENCE BETWEEN BODY POSTURE INCLINATION ANGLE OF CORRECTED GAIT AND BODY POSTURE INCLINATION ANGLE OF ORIGINAL GAIT.
S2202
DETERMINE DIFFERENCE IN ANTIPHASE ARM SWING ANGLE BETWEEN MODELS, WHICH IS THE DIFFERENCE BETWEEN ANTIPHASE ARM SWING ANGLE OF CORRECTED GAIT AND ANTIPHASE ARM SWING ANGLE OF ORIGINAL GAIT.
S2204
DETERMINE REQUIRED VALUE OF MODEL HORIZONTAL BODY POSITION STABILIZATION FLOOR REACTION FORCE MOMENT NECESSARY TO CONVERGE DIFFERENCE TO ZERO ON THE BASIS OF DIFFERENCE IN HORIZONTAL BODY POSITION BETWEEN MODELS.
S2206
DETERMINE REQUIRED VALUE OF MODEL BODY POSTURE INCLINATION ANGLE STABILIZATION FLOOR REACTION FORCE MOMENT NECESSARY TO CONVERGE DIFFERENCE TO ZERO ON THE BASIS OF DIFFERENCE IN BODY POSTURE INCLINATION ANGLE BETWEEN MODELS.
S2208
DETERMINE REQUIRED VALUE OF MODEL ANTIPHASE ARM SWING ANGLE STABILIZATION FLOOR REACTION FORCE MOMENT NECESSARY TO CONVERGE DIFFERENCE TO ZERO ON THE BASIS OF DIFFERENCE IN ANTIPHASE ARM SWING ANGLE BETWEEN MODELS.
S2210
DETERMINE MODEL HORIZONTAL BODY POSITION STABILIZATION MOMENT, MODEL BODY POSTURE ANGLE STABILIZATION MOMENT, MODEL ANTIPHASE ARM SWING ANGLE STABILIZATION MOMENT, HORIZONTAL BODY ACCELERATION, BODY POSTURE ANGULAR VELOCITY, AND ANTIPHASE ARM SWING ANGULAR ACCELERATION SUCH THAT THEY SATISFY RESTORING CONDITIONS.
S2212
MODEL MANIPULATION FLOOR REACTION FORCE MOMENT HORIZONTAL COMPONENT
= MODEL HORIZONTAL BODY POSITION STABILIZATION MOMENT
+ MODEL BODY POSTURE ANGLE STABILIZATION MOMENT
S2214
DESIRED FLOOR REACTION FORCE MOMENT HORIZONTAL COMPONENT FOR COMPLIANCE CONTROL
= COMPENSATING TOTAL FLOOR REACTION FORCE MOMENT HORIZONTAL COMPONENT Mdmdxy
+ MODEL MANIPULATION FLOOR REACTION FORCE MOMENT HORIZONTAL COMPONENT
S2216
DESIRED FLOOR REACTION FORCE MOMENT VERTICAL COMPONENT FOR COMPLIANCE CONTROL
= COMPENSATING TOTAL FLOOR REACTION FORCE MOMENT HORIZONTAL COMPONENT Mdmdz
+ FLOOR REACTION FORCE MOMENT VERTICAL COMPONENT BALANCING WITH CORRECTED GAIT
S2218
RETURN
VERTICAL

FIG.75

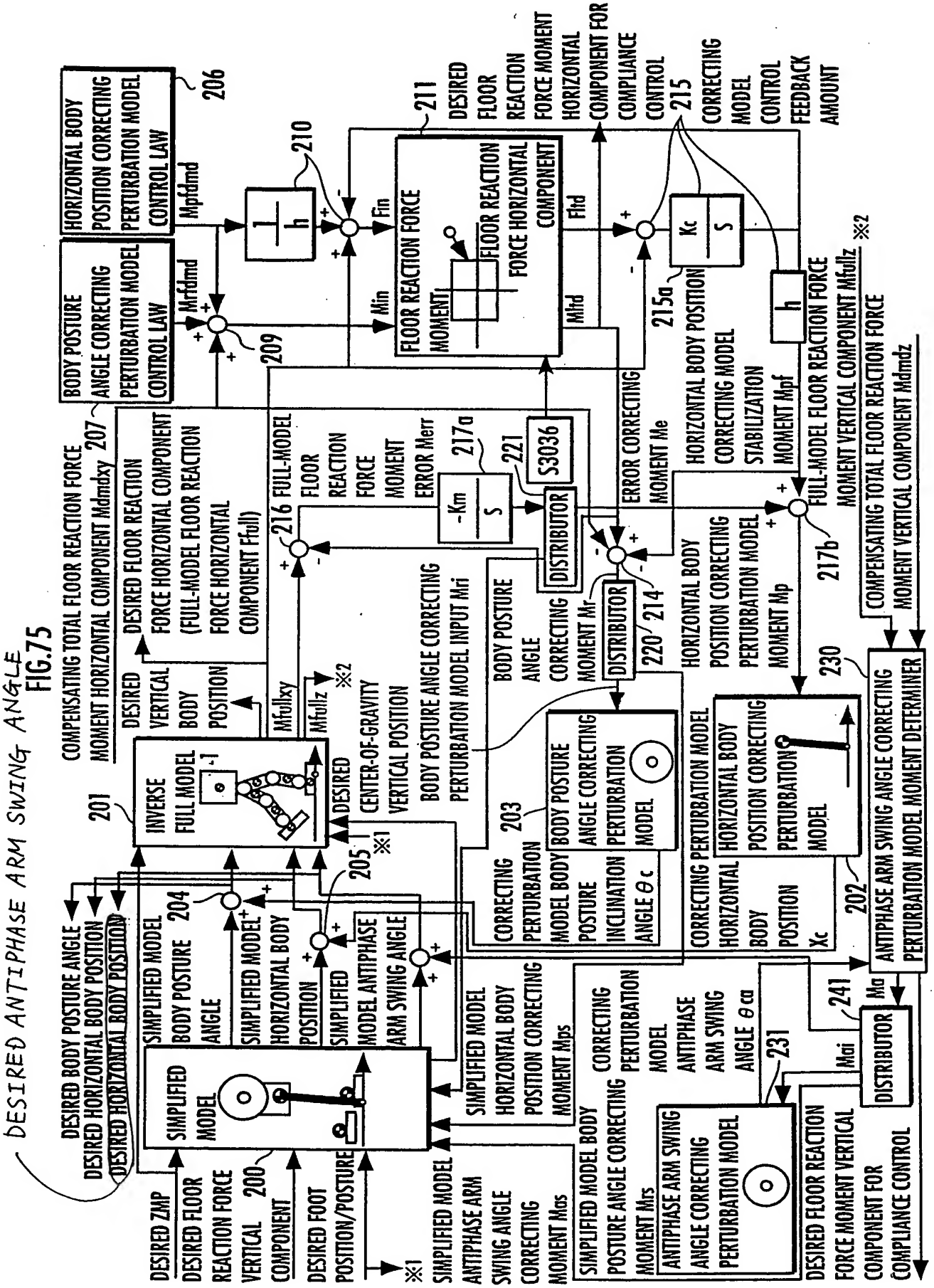
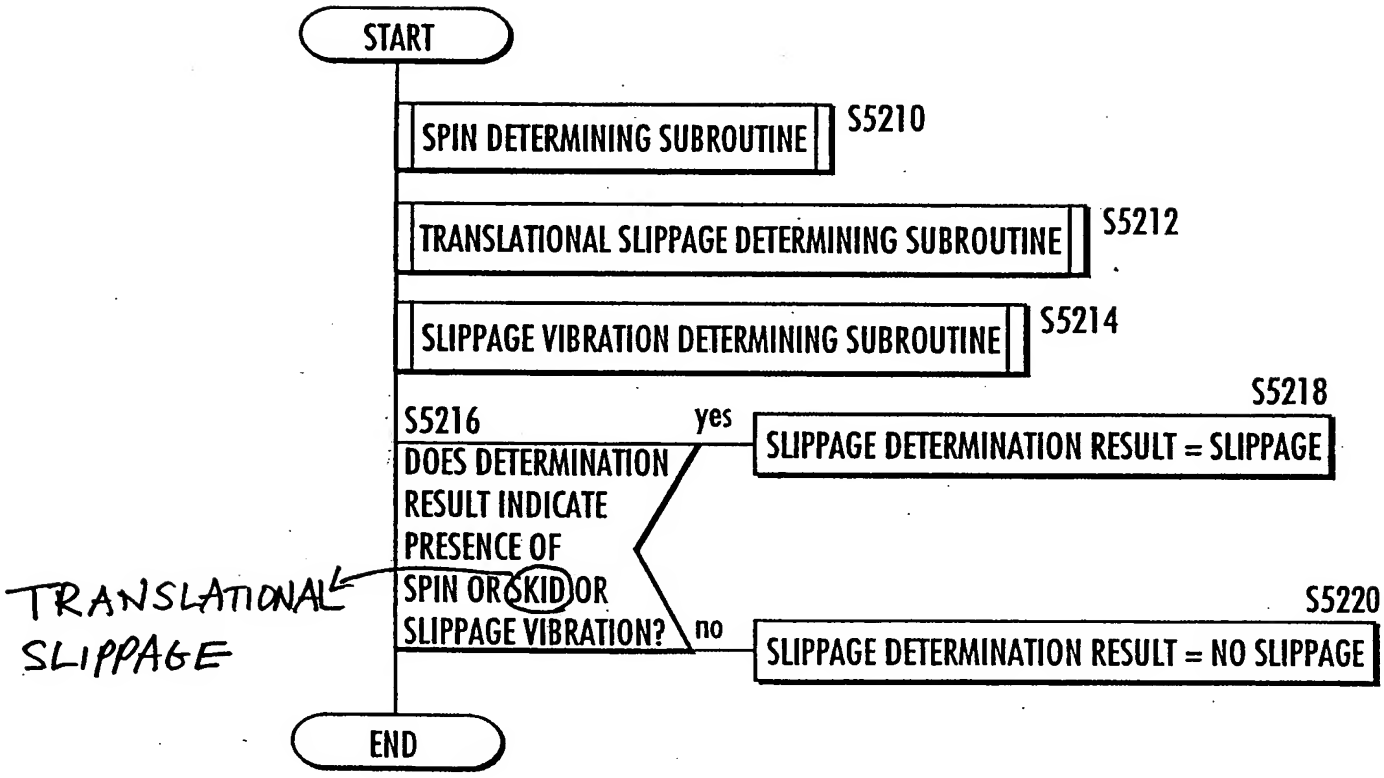

DESIRED ANTIPHASE ARM SWING ANGLE
DESIRED BODY POSTURE ANGLE
DESIRED HORIZONTAL BODY POSITION
DESIRED ZMP
DESIRED FLOOR REACTION FORCE VERTICAL COMPONENT
DESIRED FOOT POSITION/POSTURE
200
SIMPLIFIED MODEL
SIMPLIFIED MODEL BODY POSTURE ANGLE
SIMPLIFIED MODEL HORIZONTAL BODY POSITION
SIMPLIFIED MODEL ANTIPHASE ARM SWING ANGLE
204
205
※1
※2
INVERSE FULL MODEL
201
DESIRED VERTICAL BODY POSITION
COMPENSATING TOTAL FLOOR REACTION FORCE MOMENT HORIZONTAL COMPONENT Mdmdxy
207
DESIRED FLOOR REACTION FORCE HORIZONTAL COMPONENT (FULL-MODEL FLOOR REACTION FORCE HORIZONTAL COMPONENT Ftdl)
FULL-MODEL FLOOR REACTION FORCE MOMENT ERROR Merr
216
217a
-Km
S
221
S3036
DISTRIBUTOR
ERROR CORRECTING MOMENT Me
HORIZONTAL BODY POSITION CORRECTING MODEL STABILIZATION MOMENT Mpf
FULL-MODEL FLOOR REACTION FORCE MOMENT VERTICAL COMPONENT Mfullz
217b
COMPENSATING TOTAL FLOOR REACTION FORCE MOMENT VERTICAL COMPONENT Mdmdz
230
BODY POSTURE ANGLE CORRECTING MOMENT Mr
220
214
HORIZONTAL BODY POSITION CORRECTING PERTURBATION MODEL MOMENT Mp
BODY POSTURE ANGLE CORRECTING PERTURBATION MODEL
203
CORRECTING PERTURBATION MODEL BODY POSTURE INCLINATION ANGLE θc
HORIZONTAL BODY POSITION CORRECTING PERTURBATION MODEL
CORRECTING PERTURBATION MODEL HORIZONTAL BODY POSITION Xc
202
ANTIPHASE ARM SWING ANGLE CORRECTING PERTURBATION MODEL MOMENT DETERMINER
241
231
Mai
Ma
DISTRIBUTOR
SIMPLIFIED MODEL ANTIPHASE ARM SWING ANGLE CORRECTING MOMENT Mas
SIMPLIFIED MODEL HORIZONTAL BODY POSITION CORRECTING MOMENT Mps
SIMPLIFIED MODEL BODY POSTURE ANGLE CORRECTING MOMENT Mrs
CORRECTING PERTURBATION MODEL ANTIPHASE ARM SWING ANGLE θca
ANTIPHASE ARM SWING ANGLE CORRECTING PERTURBATION MODEL
DESIRED FLOOR REACTION FORCE MOMENT VERTICAL COMPONENT FOR COMPLIANCE CONTROL
BODY POSTURE ANGLE CORRECTING PERTURBATION MODEL CONTROL LAW
Mrfdmd
HORIZONTAL BODY POSITION CORRECTING PERTURBATION MODEL CONTROL LAW
Mpfdmd
206
209
210
1/h
Min
Fin
211
DESIRED FLOOR REACTION FORCE HORIZONTAL COMPONENT
FLOOR REACTION FORCE MOMENT
FLOOR REACTION FORCE HORIZONTAL COMPONENT
Mltd
Fltd
HORIZONTAL COMPONENT FOR COMPLIANCE CONTROL
215
CORRECTING MODEL CONTROL FEEDBACK AMOUNT
Kc
S
215a
h

FIG.79


START
SPIN DETERMINING SUBROUTINE
S5210
TRANSLATIONAL SLIPPAGE DETERMINING SUBROUTINE
S5212
SLIPPAGE VIBRATION DETERMINING SUBROUTINE
S5214
S5216
DOES DETERMINATION RESULT INDICATE PRESENCE OF SPIN OR SKID OR SLIPPAGE VIBRATION?
yes
S5218
SLIPPAGE DETERMINATION RESULT = SLIPPAGE
no
S5220
SLIPPAGE DETERMINATION RESULT = NO SLIPPAGE
END
TRANSLATIONAL SLIPPAGE